

When scientists cannot observe the aurora visually or take photographs of it, they follow the course of the aurora with radar. This is important on cloudy nights and by day, when the light from the aurora is invisible to man's eye. The aurora can also be studied by means of radio and radio astronomy. The pattern of auroral interference with ordinary radio transmissions on the earth and with the arrival on the earth of radio waves from distant stars tells the scientists much about the aurora. Their observations will provide a broad record of the behavior of the aurora, making possible maps showing auroral distribution at different times and comparisons of the appearance of the aurora in different places at the same time.

Measurements of the intensity of airglow radiations will be made with photoelectric instruments of high sensitivity. The observing stations will be distributed along a longitudinal chain, reaching from Arctic North America, through middle and Latin America, to the Antarctic Continent. A few stations at different longitudes will supplement this chain in providing observations on significant variations between the Northern and Southern Hemispheres, as well as motions across the meridian.

#### GEO MAGNETISM

The magnetic field of the earth has been under continuous routine observation for over a hundred years by standard magnetic observatories distributed over the earth. At the present time there are about 80 such observatories maintained by the respective governments of the countries in which they are situated. From the data of these observatories the magnetic field of the earth is known to be fairly stable and unchanging. It is observed, however, to undergo variations; some are slow, measured in years, and some rapid, measured in days, hours, minutes, and seconds. The variations, although involving large amounts of energy when it is realized that they envelop the entire earth, rarely amount to more than 2 percent of the permanent magnetic field. They are seldom large enough to disturb a mariner's compass but are easily recorded by the sensitive instruments of a magnetic observatory. It is known that the permanent field and the very slow variations are due to changes of some sort in the interior or in the crust of the earth and that the more rapid fluctuations arise from influences external to the surface of the earth. These influences are not in the lower atmosphere, and therefore must be in the upper atmosphere or above.

The main emphasis of the IGY geomagnetic program consists in a series of experiments designed to yield facts about the rapid magnetic field fluctuations. This will be recorded by the existing magnetic stations and by new stations set up in polar regions and in certain equatorial regions. The new stations will of course obtain values of the permanent field as well as of the fluctuations. The fluctuations may appear only in high latitudes or may spread simultaneously over the entire earth. They are usually accompanied by disturbances in radio wave propagation, the ionosphere, and often by auroral displays; they increase with an increase in the number of sunspots, and grow less when the sunspots become less numerous. It is believed that they are due to disturbances in the upper atmosphere of the earth caused by bursts of radiation of some sort from the sun which may be